Comparing Futures for the Sacramento-San Joaquin Delta

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Engineers:

Jay Lund, UC Davis*

William Fleenor, UC Davis

Economists:

Ellen Hanak, PPIC*

Richard Howitt, UC Davis

Biologists:

Peter Moyle, UC Davis

William Bennett, UC Davis

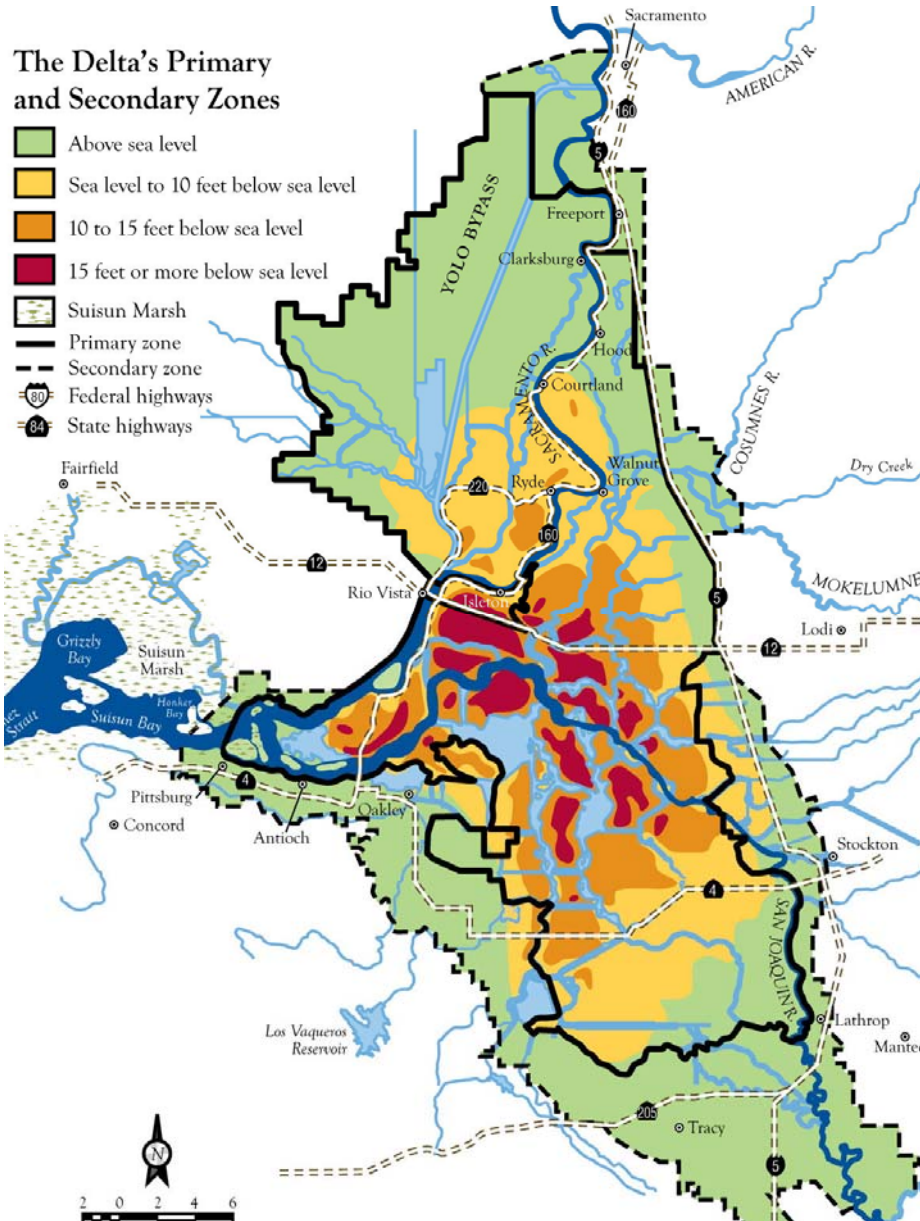
Geologist:

Jeffrey Mount, UC Davis

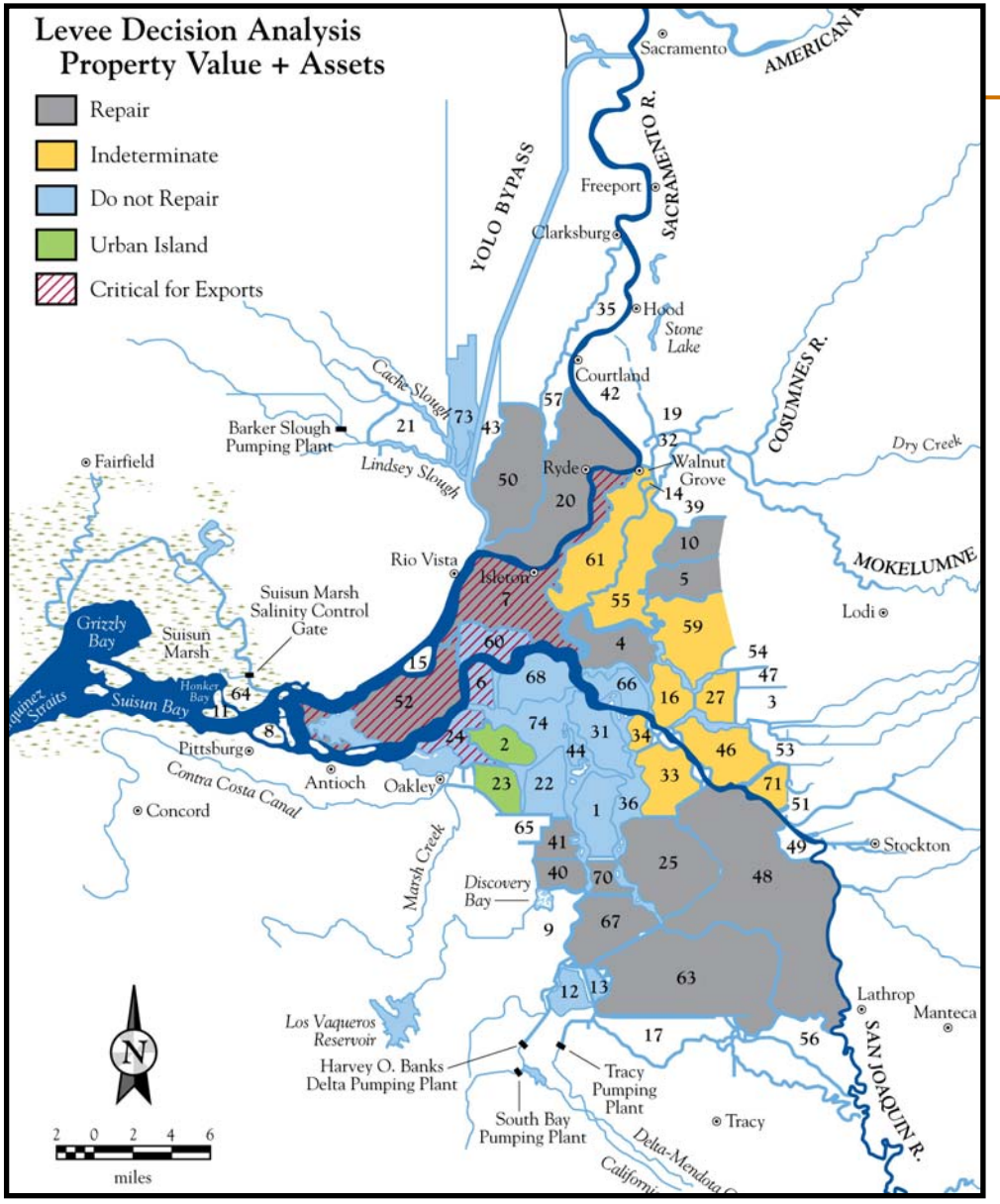
**Lead authors*

Problems of California's Sacramento-San Joaquin Delta

- Physical instability
  - Land subsidence
  - Sea level rise
  - Floods
  - Future earthquakes
- Ecosystem instability
  - Invasive species
  - Habitat alteration
- Prohibitive costs for maintaining all islands
- Worsening water quality for agric. & urban users



Delta of Tomorrow Will be Different

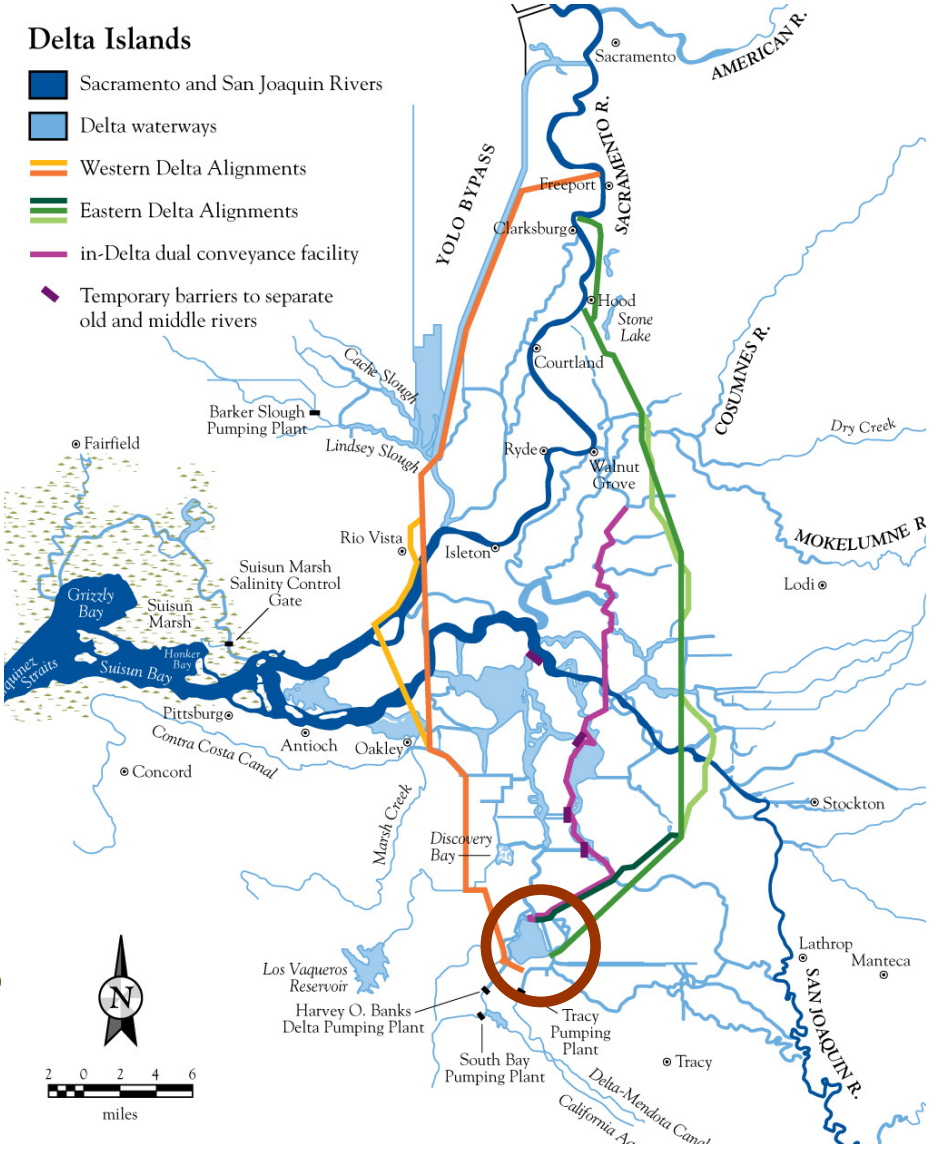


Based on economic value of land and assets, many islands not worth repairing after flooding (blue)

- Large bodies of open water and higher sea level
- Increased salinity, habitat variability
- Higher water quality costs – even if all islands remain intact

Comparing Water Export Strategies Long-Term (to Mid-Century)

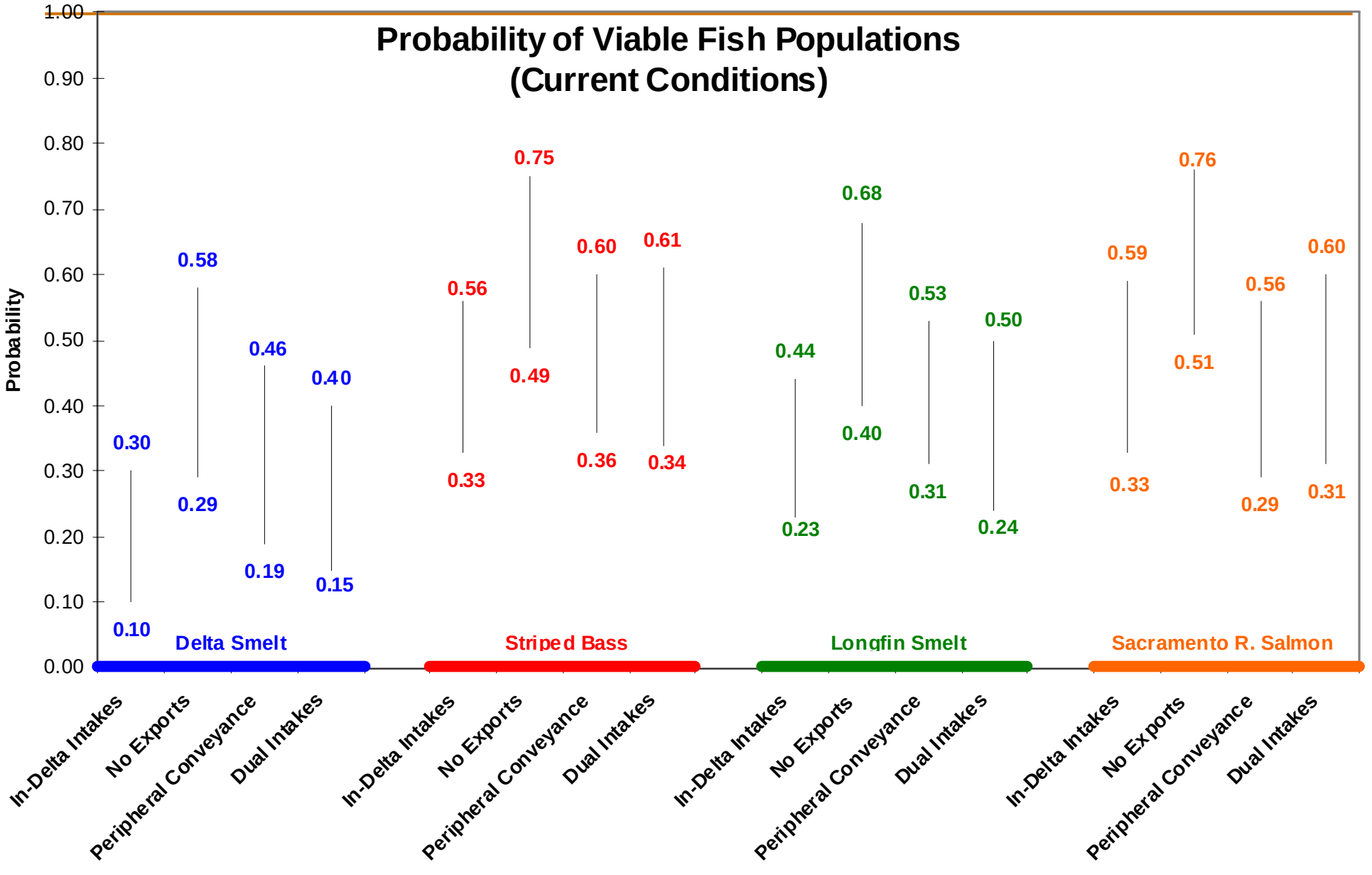
- Current Strategy: through the Delta
- Peripheral Canal: around the Delta
- Dual Conveyance: both through and around the Delta
- No Exports: use other water sources and use less



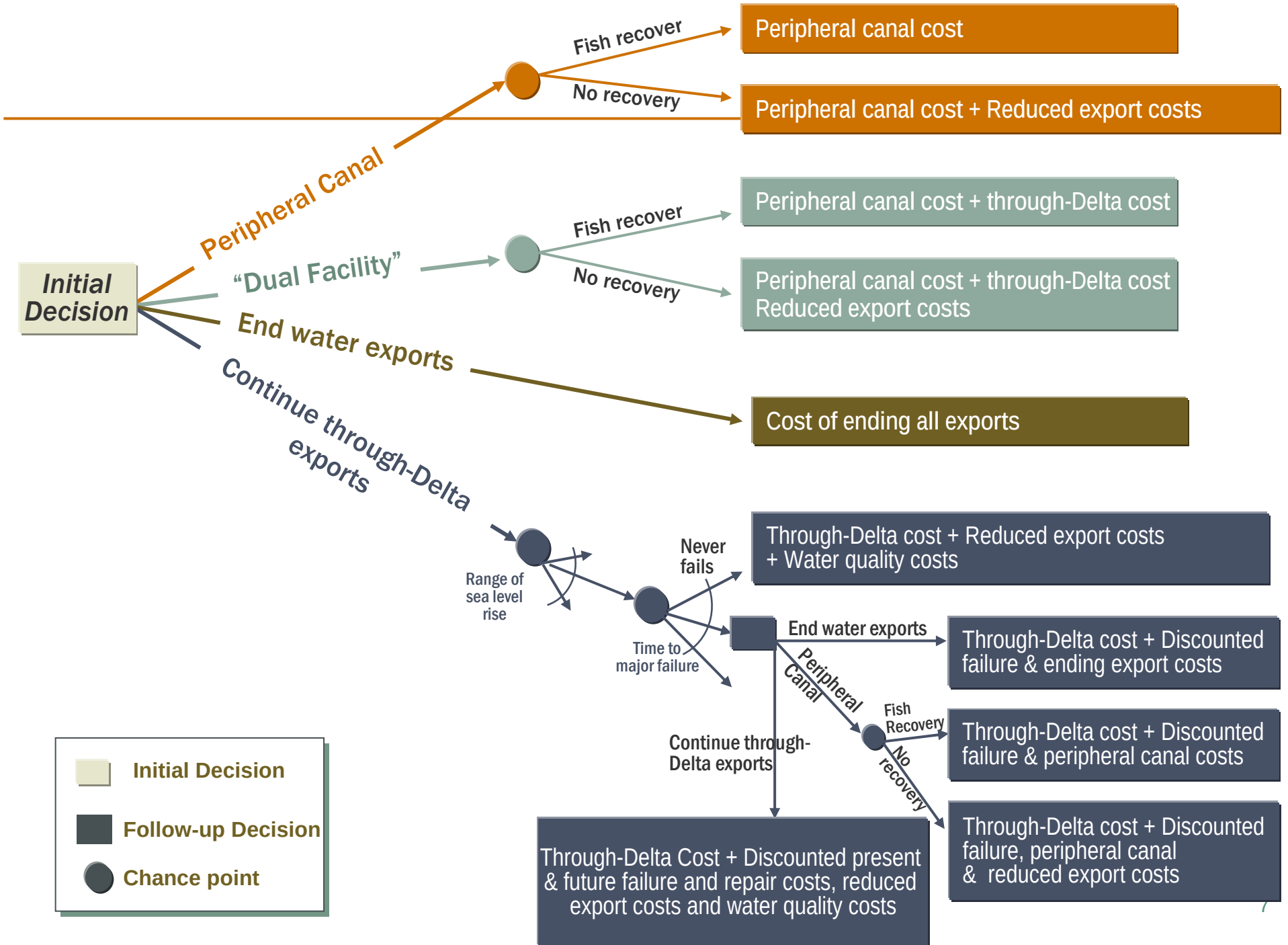
Evaluation Criteria: "Co-Equal" Goals

- Delta ecosystem
  - Delta Vision: "sustainable environment"
  - Our report: viability of native fish populations
  - Expert judgment
- Water supply
  - Delta Vision: "reliable water supply"
  - Our report: statewide economic costs
  - Construction & operations, water quality, supply cutbacks
- Use ranges to capture uncertainty

Fish Population Viability Estimates



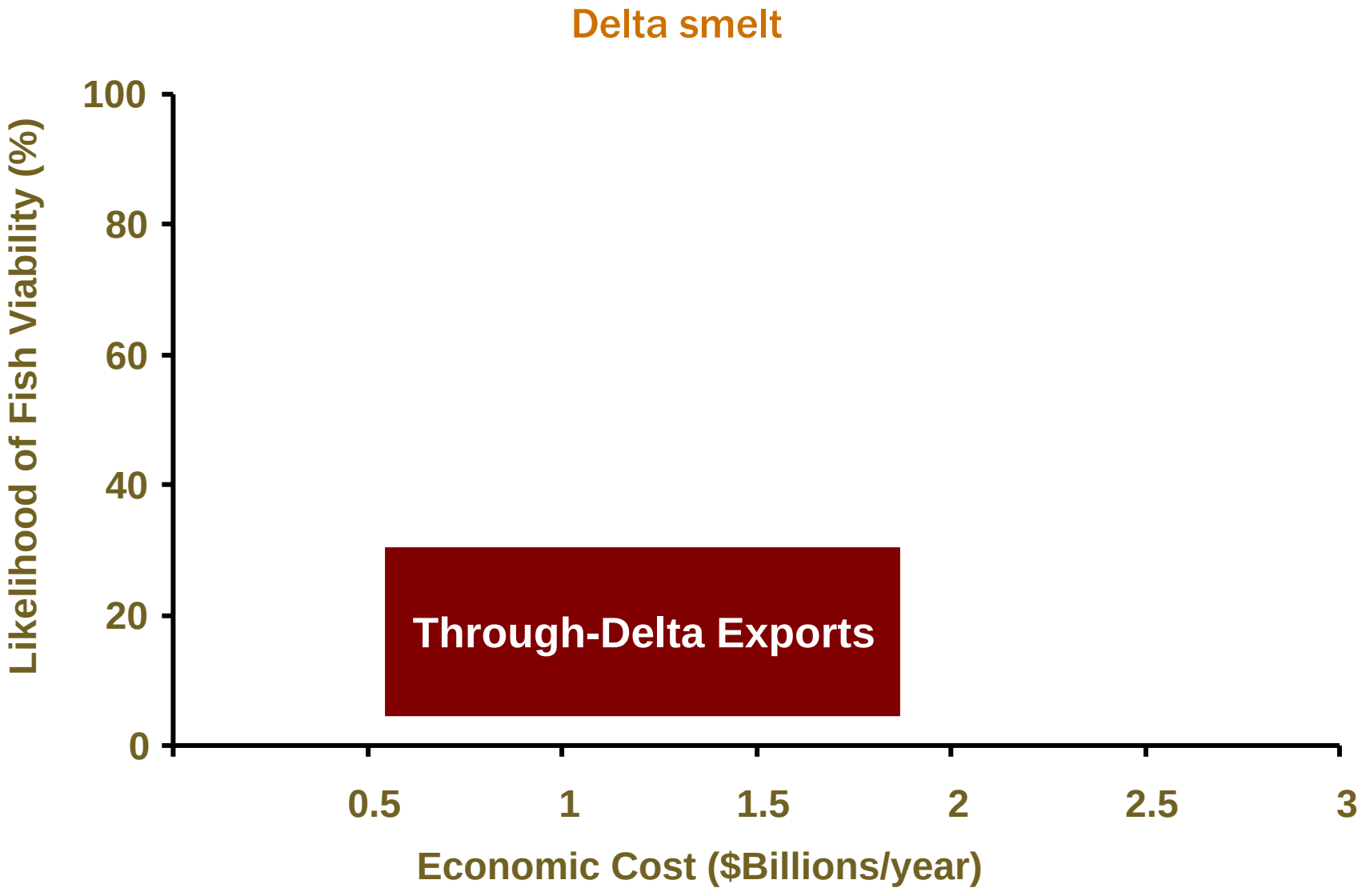
Decision Tree for Economic Cost



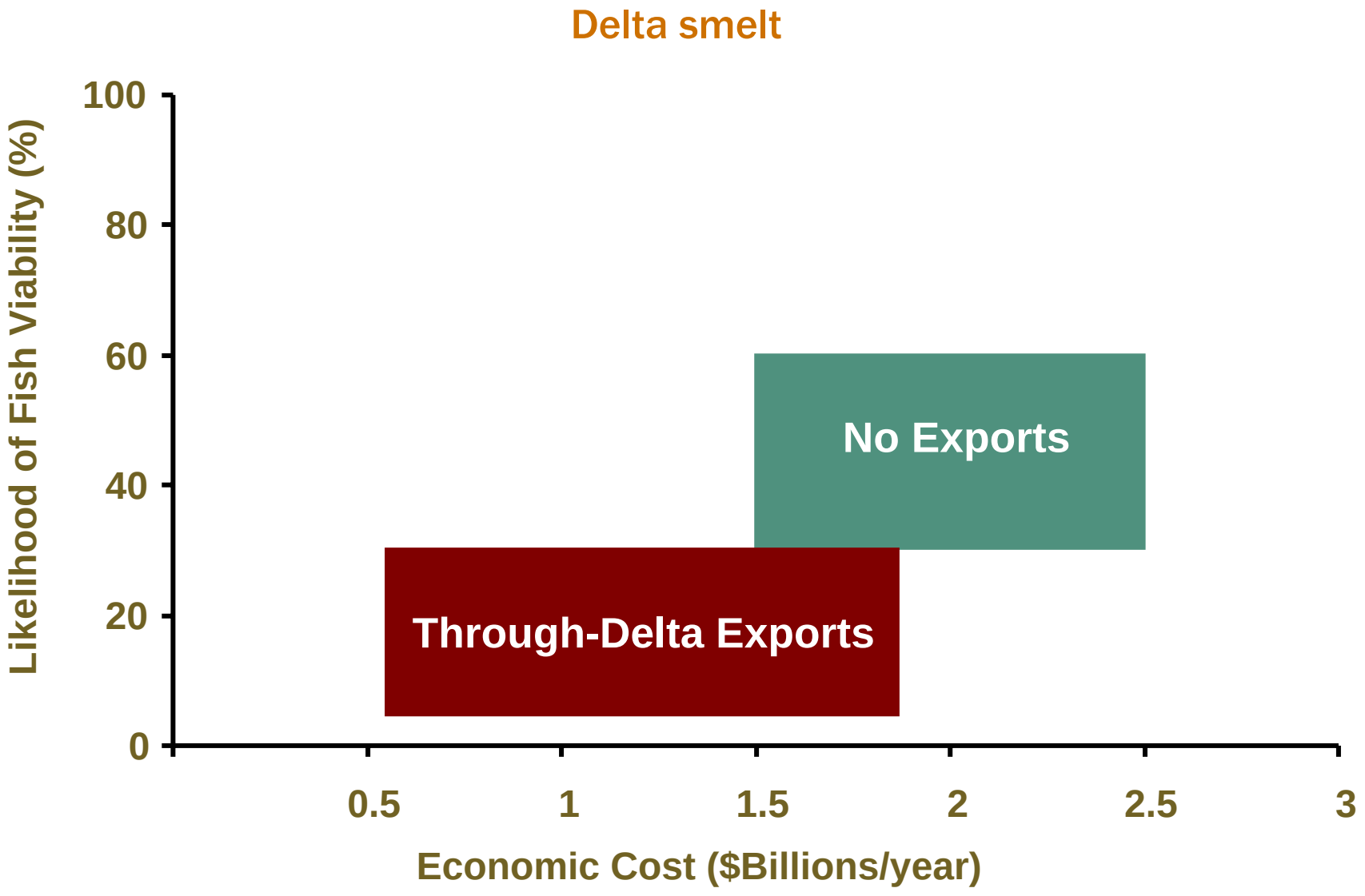
16 Questions with 32 Answers

Question	Low	High
Sea level rise (ft)		
1) How much will sea level rise by 2050?	0.5	1.5
Probability of extensive Delta failure (annual failure probability in parentheses) (%)		
2) With the minimum sea level rise?	34 (1)	88 (5)
3) With the maximum sea level rise?	57 (2)	95 (7)
Population viability in 2050 for delta smelt (Chinook salmon in parentheses) (%)		
4) Probability of viable fish pop. with continued through-Delta exports?	5 (10)	30 (30)
5) Probability of viable fish populations with no Delta exports?	30 (40)	60 (80)
6) Probability of viable fish populations with a peripheral canal?	10 (20)	40 (50)
7) Probability of viable fish populations with dual conveyance?	10 (20)	40 (50)
8) % exports reduced with continued through-Delta pumping?	25	40
9) % reduction in PC exports if fish continue to decline?	25	40
Economic and financial costs ($ billion)		
10) What is the construction cost of a peripheral canal?	4.75	9.75
11) Additional water quality cost from using Delta water?	0.3/year	1.0/year
12) What is the annualized cost of ending Delta exports?	1.5/year	2.5/year
13) Annualized cost to maintain continued through-Delta pumping?	0.15/year	0.4/year
14) Cost to water users of a sudden extensive failure of Delta levees?	7.8	15.7
15) Average cost to repair an extensive Delta levee failure?	0.2	2.5
16) What exponent relates export reduction to economic cost?*	2	3

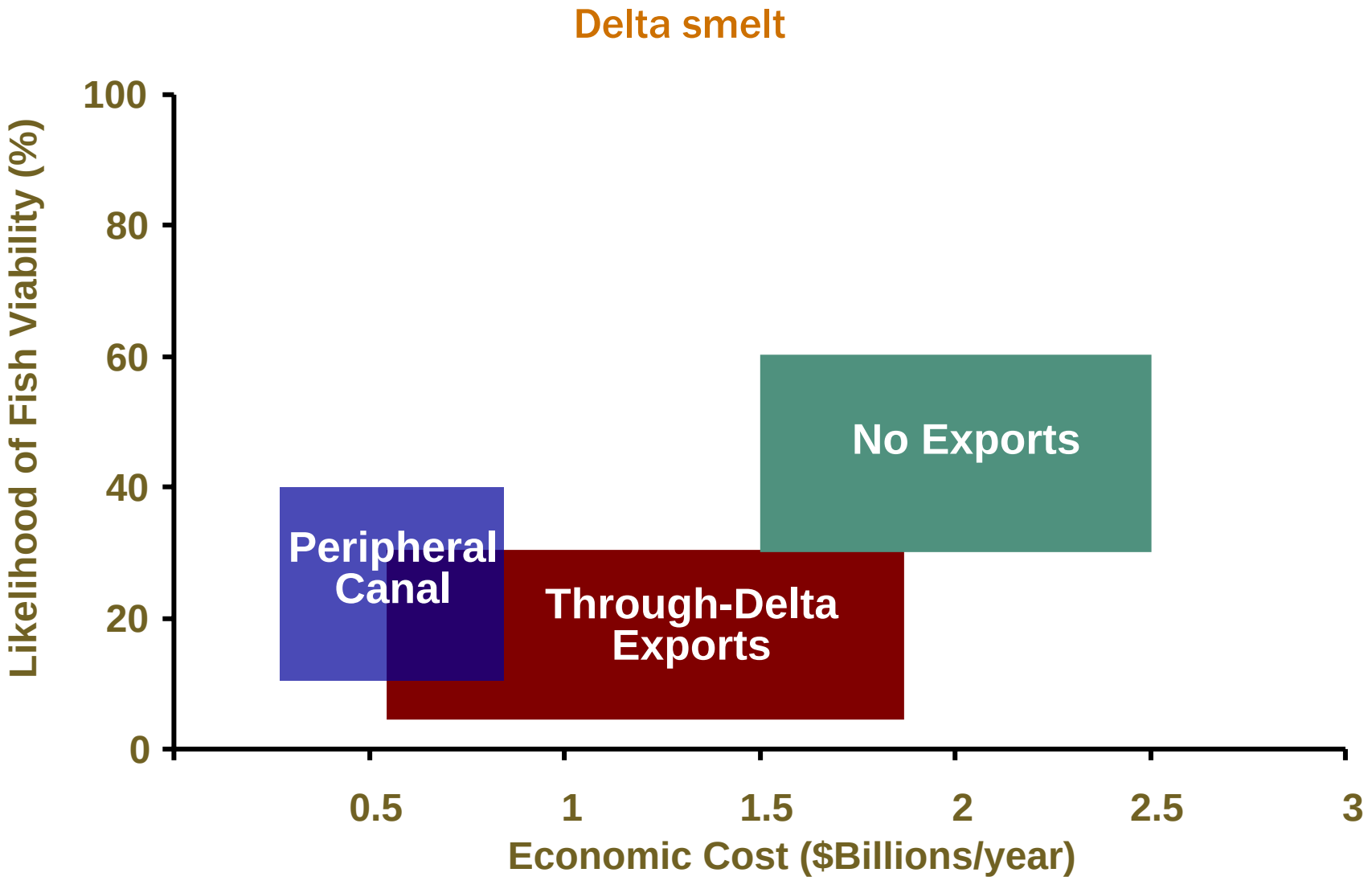
Through-Delta Pumping: Low Chance of Restoring Fish, High Costs



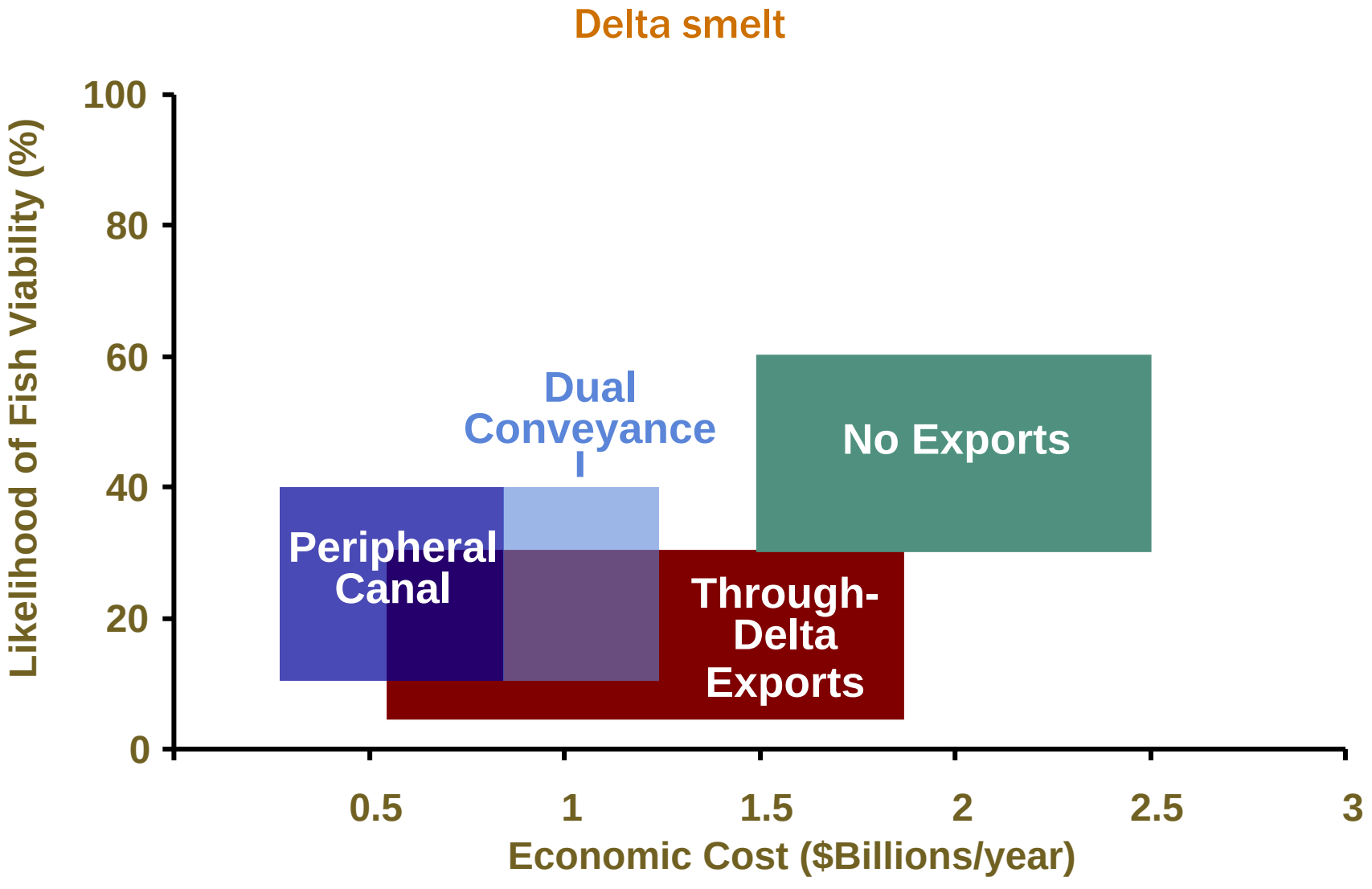
Ending Exports: Better for Fish, But Even More Costly



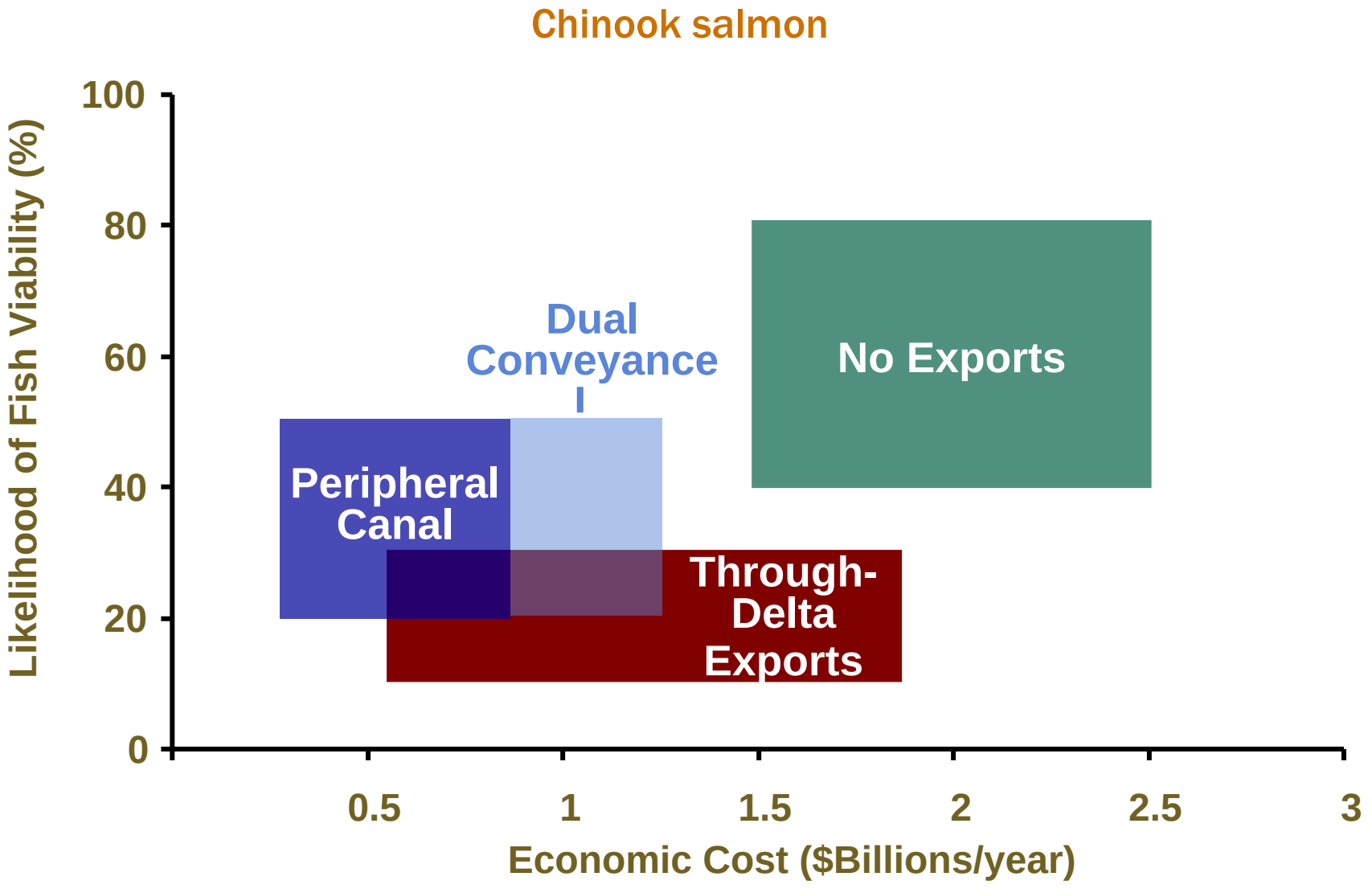
Peripheral Canal: Mid-range for Fish Viability, Least Costly



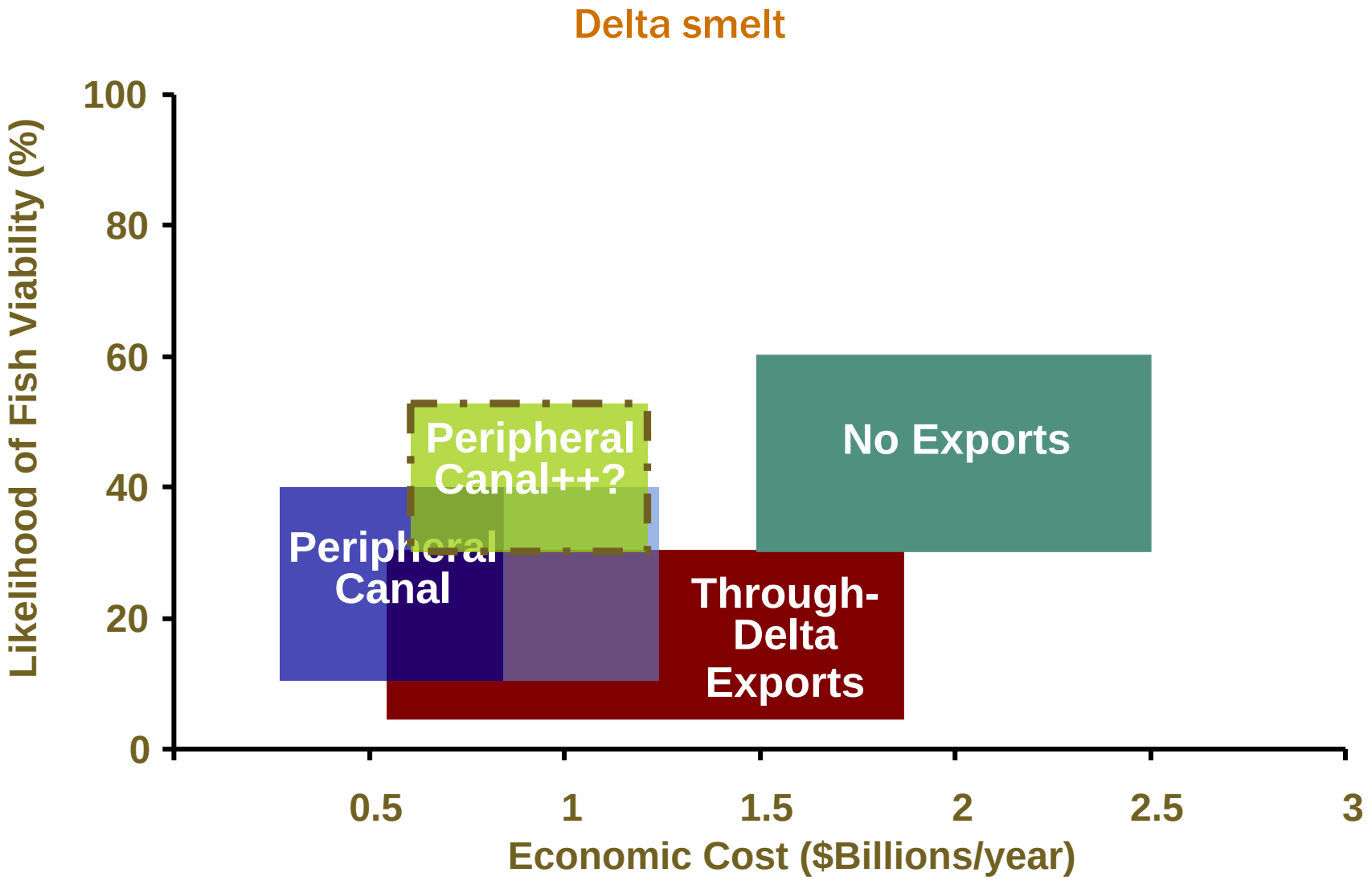
Dual Conveyance: Similar to PC for Fish, Probably More Costly



Similar Ranking for Chinook Salmon



Is there a better tradeoff?



Conclusions

- Delta inevitably will be more saline with more open water, for any water export strategy.
- Changes harm water users, but likely better for fish – especially with export pumping removed.
- Peripheral canal seems best for “co-equal” fish and water supply. No exports best for fish alone.
- Move expeditiously from Delta levees to protect water supply.

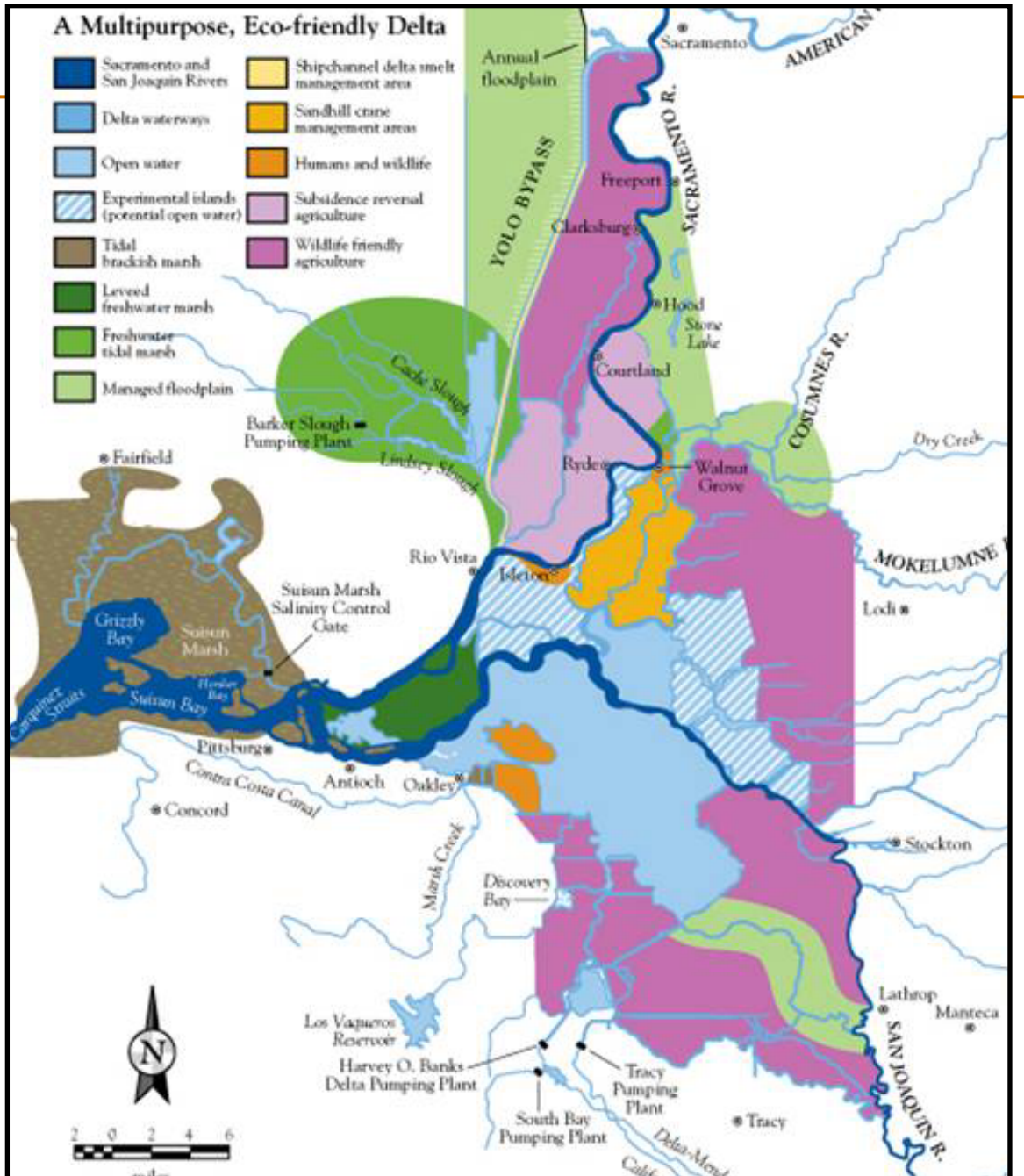
Build a Peripheral Canal for Economic, Environmental Goals

- Export users commit up front to pay for facilities
- Export water users and upstream diverters contribute funds/water for ecosystem
  - Water quality savings from a canal
- Expand PC diversions with fish conditions
- Do not arbitrarily limit canal size
  - Better environmental operations
  - Use governance & ownership safeguards
- Use PC benefits to help fund environment

Actively Prepare for a Changing Delta Ecosystem

- Habitat conservation plans should prepare for
  - Climate change
  - Rising sea levels
  - Permanent levee failures
  - New invasive species
- Ecosystem management should favor diverse habitat and flow for multiple species
- Experimentation and detailed modeling needed
  - Include flooding at least one island

One future Delta



Develop a New Framework for Delta Governance and Regulation

- Build a more centralized, decision-capable system
- State leadership (governor and legislature) is required; stakeholders cannot negotiate on their own
- Address regulatory consequences of sea level rise, climate warming, and island failures *now*

For More Information

- Research Brief, main report, technical appendices, and animations available at: www.ppic.org

Photo credit: Harold E. Malde, courtesy of The Nature Conservancy